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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DANIEL J. WOODRUFF and KYLE M. HANSON

Appeal 2009-003531
Application 10/084,962
Technology Center 1700

Decided: December 31, 2009

Before JAMES T. MOORE, *Vice Chief Administrative Patent Judge*,
ROMULO H. DELMENDO and LINDA M. GAUDETTE, *Administrative
Patent Judges*.

DELMENDO, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134(a) from a final rejection of claims 17-34 (Amended Appeal Brief filed December 31, 2007, hereinafter “Br.,” at 1-2; Final Office Action mailed December 11, 2006). We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

STATEMENT OF THE CASE

Appellants’ invention, as disclosed in the Specification, relates to an electroplating apparatus for plating semiconductor components (Specification, hereinafter “Spec.,” 1, ll. 8-9). Appellants state, however, that the claims on appeal have been copied from United States Patent 6,193,860 B1, which issued to Milind Weling on February 27, 2001 from Application 09/298,629, in order to provoke an interference (Br. 1; Prelim. Amend. filed Feb. 27, 2002 at 7-8).

Claims 17 and 32 read as follows:

17. A system for electroplating a layer of material on a semiconductor wafer, said system comprising:

an electrochemical cell, said electrochemical cell comprising a primary anode, a cathode contact, and a chamber, said primary anode and said cathode contact disposed within said chamber;

at least one secondary anode, said secondary anode for providing a variable current to said semiconductor wafer;

a metallic solution, said metallic solution disposed within said electrochemical cell; and

a power source, said power source coupled to said primary anode, to said at least one said secondary anode and to said cathode contact, said power source capable of producing said variable current by providing varying levels of voltage to said primary anode and to said secondary anode.

32. An anode system for performing an electroplating operation, said anode system comprising:

a plurality of anodes, said plurality of anodes for performing an electroplating operation on a part, said plurality of anodes insulatively coupled together, said electroplating operation controlled by providing a variable current on said plurality of anodes via varying levels of voltage; and

a plurality of leads, each of said plurality of leads respectively coupled to one of said plurality of anodes, each of said plurality of leads insulatively coupled to any other said plurality of leads such that each of said plurality of leads has the capability of providing an independent electrical current from a power source to its respective one said plurality of anodes.

(Claims App'x.)

The Examiner relied upon the following as evidence of unpatentability (Examiner's Answer mailed April 8, 2008, hereinafter "Ans.," 2; Miscellaneous Communication mailed April 24, 2008):

Van Raalte	3,880,725	Apr. 29, 1975
Lowery	5,670,034	Sept. 23, 1997
Inagaki ¹	JP 59-150094	Aug. 28, 1984

¹ We rely on and cite to the English translation of Inagaki of record.

Uemura (“Hirohiko”)² JP 04-311591

Nov. 4, 1992

The Examiner rejected the claims as follows:

- I. Claims 17, 21, and 22 under 35 U.S.C. § 102(b) as anticipated by Lowery (Ans. 3-4);
- II. Claims 17, 21, 22, and 24-32 under 35 U.S.C. § 102(b) as anticipated by Van Raalte (Ans. 4-5);
- III. Claims 17-22 and 24-34 under 35 U.S.C. § 102(b) as anticipated by Inagaki (Ans. 5-6);
- IV. Claim 23 under 35 U.S.C. § 103(a) as unpatentable over Inagaki (Ans. 6);
- V. Claims 17-29 under 35 U.S.C. § 103(a) as unpatentable over Hirohiko (Ans. 6-8); and
- VI. Claims 30-34 under 35 U.S.C. § 103(a) as unpatentable over the combined teachings of Hirohiko and Van Raalte (Ans. 8).

ISSUES

I. Claims 17, 21, and 22: Anticipation by Lowery

The Examiner found that Lowery discloses every limitation of claim 17 (Ans. 3-4). With regard to the limitation “power source capable of producing said variable current by providing varying levels of voltage to said primary anode and to said secondary anode” (claim 17), the Examiner alleged that Lowery’s power source is inherently capable of providing

² Appellants and the Examiner both refer to this document as “Hirohiko.” To avoid confusion, we also refer to it as “Hirohiko.” We rely on and cite to the English translation of Hirohiko of record.

various current to the primary and secondary anodes because “simply turning on and off the power source . . . provide[s] different current to the primary and secondary anodes” (Ans. 4).

Appellants, on the other hand, assert that the claim limitation specifies a variable current, which is effected by varying levels of voltage applied to the primary and secondary anodes (Br. 9).

Thus, the issue arising from the contentions of the Examiner and Appellants is:

Have Appellants shown reversible error in the Examiner’s conclusion that the disputed limitation in claim 17 reads on Lowery’s power source, which merely has the capability of being turned on and off?

II. Claims 17, 21, 22, and 24-32: Anticipation by Van Raalte

The Examiner found that although Van Raalte does not explicitly state that the disclosed apparatus is suitable for plating a semiconductor wafer as recited in claim 17, it nevertheless anticipates because the recited function would appear to be inherent in the prior art apparatus in view of its structural identity to the claimed apparatus (Ans. 4-5 and 9-10).

Appellants, on the other hand, contend that “the problems addressed by Van Raalte are wholly unlike those which the present invention involves, and, for that reason, does not describe a system which includes a semiconductor wafer as the substrate to be plated” (Br. 10-11).

Thus, the issue arising from the contentions of the Examiner and Appellants is:

Have Appellants shown reversible error in the Examiner's finding that Van Raalte inherently discloses a system capable of plating semiconductor wafers, as required in claim 17?

III. Claims 17-22 and 24-34: Anticipation by Inagaki

The Examiner found that Inagaki discloses every limitation of claim 17, including the limitation "power source capable of producing said variable current by providing varying levels of voltage to said primary anode and to said secondary anode" (claim 17) (Ans. 5-6).

Appellants, on the other hand, contend that Inagaki fails to teach various levels of voltage to different anodes (Br. 12-14). Furthermore, Appellants assert that the Examiner's rejection should be reversed because Appellants' claims have been substantially copied from the Weling patent (Br. 14).

Thus, the issues arising from the contentions of the Examiner and Appellants are:

Have Appellants shown reversible error in the Examiner's finding that Inagaki discloses an electroplating system including a power source that is capable of producing a variable current by providing varying levels of voltage to primary and secondary anodes, as required by claim 17?

Have Appellants shown reversible error in the Examiner's finding that Inagaki anticipates the claimed invention because the claims have been substantially copied from Weling's patent?

IV. Claim 23: Obviousness over Inagaki

Appellants do not provide any separate arguments against the obviousness rejection of claim 23, which depends from claim 17, over Inagaki. Accordingly, the issues are the same as in Rejection III.

V. Claims 17-29: Obviousness over Hirohiko

The Examiner acknowledged that Hirohiko differs from claim 17 in that it does not explicitly disclose a “power source capable of producing said variable current by providing varying levels of voltage to said primary anode and to said secondary anode” (Ans. 6-7). The Examiner, however, concluded that “one of ordinary skill in the art would have found it obvious to implement a power source capable of providing variable current to the anodes in order to control the plating speed and uniformity” (*id.* at 7). Alternatively, the Examiner asserted that Hirohiko teaches an electroplating apparatus that is structurally the same as the claimed apparatus because the *use* of the claimed apparatus for providing various levels of voltage to different anodes does not differentiate the claimed apparatus from the prior art (Ans. 11). According to the Examiner, the broadest reasonable interpretation of the claimed subject matter allows for construing the claim to read on the prior art system, which can be turned on and off (*id.*).

Appellants, on the other hand, contend that the prior art fails to teach providing various levels of voltages to different anodes, as required by the claimed subject matter (Br. 14). Furthermore, Appellants assert that the limitation imparts additional structure (*id.* at 15).

Thus, the issues arising from the contentions of the Examiner and Appellants are:

Have Appellants shown reversible error in the Examiner's conclusion that it would have been obvious to modify Hirohiko's electroplating apparatus to include a power source capable of producing variable current by providing varying levels of voltage to the primary and secondary anodes in order to control plating speed and uniformity?

Have Appellants shown reversible error in the Examiner's finding that Hirohiko discloses the same structure as the claimed system for electroplating, including a power source capable of producing a variable current by providing varying levels of voltage to the primary anode and the secondary anode?

VI. Claims 30-34: Obviousness over Hirohiko and Van Raalte

The Examiner found that Hirohiko discloses every limitation of claim 32 except for independently connecting anodes to the power source for providing variable current (i.e., "a plurality of leads, each of said plurality of leads respectively coupled to one of said plurality of anodes . . . each of said plurality of leads has the capability of providing an independent electrical current from a power source to its respective one said plurality of anodes") (Ans. 8). To account for this difference, the Examiner relied on Van Raalte, which is said to teach a power source capable of providing an independently controlled electrical current to each of a plurality of anodes and inherently comprises leads between the power source and anodes (Ans. 4-5). The Examiner then concluded that it would have been obvious to modify Hirohiko's electroplating apparatus with Van Raalte's power source, which

is independently connected by leads to different anodes for providing independent current levels from the power source to the different anodes, in order to obtain an easier and more accurate electrodeposition of a metal film having a desired thickness profile (Ans. 8).

Appellants, on the other hand, assert that Hirohiko does not teach providing various levels of voltages to different anodes and that Van Raalte “fails to overcome the deficiencies of Hirohiko” (Br. 14). Furthermore, Appellants contend that because the claims were copied from Weling’s patent “it is entirely inappropriate . . . to allow claims to one party . . . and deny them to another by taking legally inconsistent positions” (Br. 15).

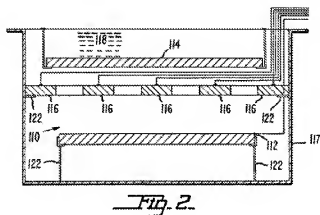
Thus, the issues arising from the contentions of the Examiner and Appellants are:

Have Appellants shown reversible error in the Examiner’s obviousness conclusion as to claim 32, because Van Raalte does not explicitly teach plating semiconductors and does not address the same problems addressed by the claimed invention?

Have Appellants shown reversible error in the Examiner’s obviousness conclusion because the claims have been copied from a patent?

FINDINGS OF FACT ("FF")

1. Van Raalte's Figure 2 is reproduced below:



- Figure 2 depicts an apparatus 110 including an electroplating reactor vessel 117 containing electroplating solution immersing electrodes 116, article (i.e., workpiece) 112, and a body 114 of plating material for forming an electroplated metal film on the article 112 (col. 2, ll. 29-32; col. 3, ll. 50-54; col. 3, l. 66 to col. 4, l. 1; and col. 4, ll. 55-65).
2. Van Raalte discloses that "[e]ach one of the modifying electrodes 116 is electrically connected to a source of electrical energy (not shown) in such a manner whereby an electrical potential can be established at each one of the modifying electrodes 116" (col. 3, ll. 62-66; fig. 2).
 3. Van Raalte discloses that "[v]arying the relative electrical potentials at the article 112, the body 114 of plating material and each one of the modifying electrodes 116 . . . causes differences in electrical potential to be established between the

article 112, the body 114 of plating material and each one of the modifying electrodes 116” (col. 4, ll. 1-7; fig. 2).

4. Van Raalte teaches that “[t]hese differences in electrical potential can be utilized to form a metal film having any predetermined thickness profile on the article 112 without the necessity of devising different apparatus for each thickness profile desired” (col. 4, ll. 7-11; fig. 2).
5. Inagaki’s Figure 9 is reproduced below:

Figure 9

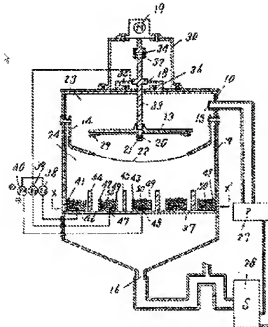


Figure 9 depicts a plating device including a common cathode 13 and anode electrodes 41, 42, and 43 connected to three independent DC power sources 38, 39, and 40 (Inagaki at 12-13).

6. Inagaki discloses that “each anode is connected to the . . . common cathode through [a] respective power source so as to

control the DC voltage impressed between [the] respective anode and cathode (Inagaki at 12).

7. Inagaki discloses an exemplary electroplating method wherein the respective ratios (i.e., impressed voltages) of the power sources 38 : 39 : 40 were 0.8 : 1 : 1.1 (Inagaki at 15; fig. 9).
8. Hirohiko's Figure 1 is reproduced below:

Figure 1

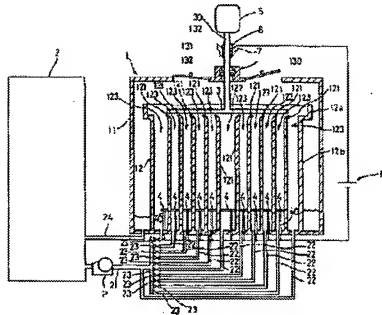


Figure 1 depicts an electroplating apparatus including a plurality of concentric anodes 4 separated by dielectric walls 121 and a rotary electrode 3 (i.e., cathode) all immersed in a metallic plating solution within an inner vessel 12, wherein a power supply 6 is electrically connected to the anodes and cathode ([0016] – [0019]).

9. Hirohiko does not disclose a power source independently connected to anodes for providing variable current to the anodes.

PRINCIPLES OF LAW

The absence of a disclosure relating to function does not defeat an anticipation rejection because it is well settled that the recitation of a new intended use for an old apparatus does not make a claim to that old apparatus patentable. *In re Schreiber*, 128 F.3d 1473, 1477 (Fed. Cir. 1997). Where a claimed apparatus and a prior art apparatus have the same or substantially the same structure, it is appropriate to shift the burden of proof to applicant to prove that the prior art apparatus does not necessarily or inherently possess the characteristics of the claimed apparatus. *In re Best*, 562 F.2d 1252, 1255 (CCPA 1977).

“[I]f a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.” *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 417 (2007).

While *KSR* explains that an obviousness “analysis need not seek out precise [prior art] teachings,” it nonetheless did not dispense with the need, in relevant cases, for evaluating the evidence to determine whether a person having ordinary skill in the art would have had “an apparent reason to combine the known elements in the fashion claimed.” *Id.* at 418.

ANALYSIS

I. Rejection of Claims 17, 21, and 22 as Anticipated by Lowery

We agree with Appellants that the Examiner has not sufficiently established that the prior art power source is capable of providing “variable current,” as recited in claim 17. The Examiner asserted that turning

Lowery's power source on and off produces "variable current" (Ans. 4). But when the power source is off, there is no current at all. Here, the Examiner has failed to direct us to any evidence in Lowery indicating that the power source is capable of providing at least two different levels of current. Because Lowery does not disclose every limitation of the claimed invention, we cannot uphold the Examiner's anticipation rejection.

II. Rejection of Claims 17, 21, 22, and 24-32 as Anticipated by Van Raalte

Appellants rely on the same arguments for all the appealed claims subject to this rejection (Br. 10-12). Accordingly, we select claim 17 as representative and confine our discussion to this selected claim. *See* 37 C.F.R. § 41.37(c)(1)(vii).

Appellants' contention that Van Raalte does not describe a system including a semiconductor wafer as the substrate to be plated is unpersuasive to show that the Examiner erred. Claim 17 recites: "A system *for* electroplating a layer of material on a semiconductor wafer . . ." (emphasis added). As found by the Examiner (Ans. 4-5), Van Raalte discloses an electroplating system that is structurally indistinguishable from that recited in claim 17 (FF 1-3). Because Van Raalte's electroplating system reasonably appears to be structurally identical or substantially identical to Appellants' claimed electroplating system, the Examiner had a reasonable basis to shift the burden to Appellants to show that the prior art electroplating system is not capable of electroplating a semiconductor wafer, as required in claim 17. *In re Schreiber*, 128 F.3d at 1478; *In re Best*, 562 F.2d at 1255. Appellants have not directed us to any persuasive evidence that discharges that burden.

III. Rejection of Claims 17-22 and 24-34 as Anticipated by Inagaki

Appellants' contention that the Examiner erred because Inagaki fails to teach the concept of various levels of voltage to different anodes is unpersuasive. As found by the Examiner, Inagaki discloses an electroplating system that is capable of applying varying levels of voltage to different anodes (Ans. 5-6 and 10; FF 5-7). Indeed, in an exemplary method, Inagaki discloses impressing voltages to three different anodes in a ratio of 0.8 : 1 : 1.1 (FF 7). Thus, Appellants have not shown error in the Examiner's finding of anticipation.

We also find no persuasive merit in Appellants' contention that the Examiner erred because the claims have been substantially copied from Weling's patent. Claims must be adjudged as to patentability on the record in their own case. As instructed by the predecessor to our reviewing court, "it is immaterial in ex parte prosecution whether the same or similar claims have been allowed to others." *In re Wertheim*, 541 F.2d 257, 264 (CCPA 1976). *See also In re Giolito*, 530 F.2d 397, 400 (CCPA 1976) ("We reject appellants' argument that the instant claims are allowable because similar claims have been allowed in a patent.").

IV. Rejection of Claim 23 as Unpatentable over Inagaki

Because Appellants do not submit any separate arguments regarding the obviousness rejection of dependent claim 23 over Inagaki, we affirm Rejection IV for the same reasons discussed above with respect to Rejection III.

V. Rejection of Claims 17-29 as Unpatentable over Hirohiko

We agree with Appellants that the Examiner erred in concluding obviousness as to claims 17-29 over Hirohiko. While the Examiner concluded that one of ordinary skill in the art would have implemented a power source capable of providing variable current in Hirohiko's electroplating apparatus to control plating speed and uniformity (Ans. 7), Appellants point out that Hirohiko does not teach or otherwise suggest this limitation (Br. 14). The Examiner, however, has not identified any evidence or acceptable technical reasoning in support of such a conclusion.

We also agree with Appellants that the limitation of a power source capable of producing a variable current by providing varying levels of voltage to primary and secondary anodes has structural limitations not found in Hirohiko. The Examiner found that Hirohiko discloses a power source coupled to the anodes and the cathode (Ans. 6) and then asserted that because the power source is capable of being turned on and off, it is capable of producing a variable current (*id.* at 11). As discussed above, however, no current flows when the power source is off. Thus, the Examiner has failed to adequately explain how the current is actually varied in Hirohiko.

*VI. Rejection of Claims 30-34 as Unpatentable over Hirohiko and
Van Raalte*

Appellants rely on the same arguments for all the appealed claims subject to this rejection (Br. 14-15). Accordingly, we select claim 32 as representative and confine our discussion to this selected claim. *See* 37 C.F.R. § 41.37(c)(1)(vii).

Appellants contend that the Examiner's rejection is in error because Hirohiko "fails to teach providing various levels of voltages to different anodes" and Van Raalte "fails to overcome the deficiencies of Hirohiko" in that Van Raalte does not explicitly teach plating semiconductors and does not address the same problems addressed by the claimed invention (Br. 14).

We disagree with Appellants. Appellants' only argument with respect to Hirohiko is that it fails to teach providing various levels of voltages to different anodes. However, the Examiner acknowledged this difference. This difference was resolved with the teachings of Van Raalte, which discloses an electroplating system including a plurality of anode segments that are connected by leads to a power source, which is capable of producing independently controlled current to each anode by providing different electrical potentials at each anode in order to obtain a metal film having a predetermined thickness profile (Ans. 4; FF 1-4). Because Appellants do not advance any additional argument against either Hirohiko or Van Raalte other than those already made in Rejection II, which we found unpersuasive, Appellants have failed to show reversible error. Thus, we uphold the Examiner's conclusion that "[i]t would have been obvious to one of ordinary skill in the art to have incorporated the independently controlled power source to anode connections as taught by Van Raalte into the plurality of concentric anodes of Hirohiko in order to achieve more accurate and easy electrodeposition to form a metal film with desired thickness profile (col. 4 lines 7-11, 30-35)" (Ans. 8). *KSR*, 550 U.S. at 417.

Finally, we find no persuasive merit in Appellants' contention that the Examiner erred because the claims were copied from a patent. Again,

claims must be adjudged as to patentability on the record in their own case.
See Wertheim, 541 F.2d at 264; *Giolito*, 530 F.2d at 400.

CONCLUSION

Rejection I

Appellants have shown reversible error in the Examiner's conclusion that the disputed limitation in claim 17 reads on Lowery's power source, which merely has the capability of being turned on and off.

Rejection II

Appellants have not shown reversible error in the Examiner's finding that Van Raalte inherently discloses a system capable of plating semiconductor wafers, as required in claim 17.

Rejections III and IV

Appellants have not shown reversible error in the Examiner's finding that Inagaki discloses an electroplating system including a power source that is capable of producing a variable current by providing varying levels of voltage to primary and secondary anodes, as required by claim 17.

Appellants have not shown reversible error in the Examiner's finding that Inagaki anticipates the claimed invention based upon an argument that the claims have been substantially copied from Weling's patent.

Rejection V

Appellants have shown reversible error in the Examiner's conclusion that it would have been obvious to modify Hirohiko's electroplating

apparatus to include a power source capable of producing variable current by providing varying levels of voltage to the primary and secondary anodes in order to control plating speed and uniformity.

Appellants have shown reversible error in the Examiner's finding that Hirohiko discloses the same structure as the claimed system for electroplating, including a power source capable of producing a variable current by providing varying levels of voltage to the primary anode and the secondary anode.

Rejection VI

Appellants have not shown reversible error in the Examiner's obviousness conclusion, as to claim 32, based upon an argument that Van Raalte does not explicitly teach plating semiconductors and does not address the same problems addressed by the claimed invention.

Appellants have not shown reversible error in the Examiner's obviousness conclusion based upon an argument that the claims have been copied from a patent.

DECISION

The Examiner's rejections of:

claims 17, 21, 22, and 24-32 under 35 U.S.C. § 102(b) as anticipated by Van Raalte;

claims 17-22 and 24-34 under 35 U.S.C. § 102(b) as anticipated by Inagaki;

claim 23 under 35 U.S.C. § 103(a) as unpatentable over Inagaki; and

claims 30-34 under 35 U.S.C. § 103(a) as unpatentable over the combined teachings of Hirohiko and Van Raalte are affirmed.

We reverse, however, the Examiner's decision to reject: claims 17, 21, and 22 under 35 U.S.C. § 102(b) as anticipated by Lowery; and

claims 17-29 under 35 U.S.C. § 103(a) as unpatentable over Hirohiko. No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

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